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## Notes on Mammals from Sonora, Mexico

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During the past few years a number of trips have been made into Sonora, Mexico, primarily as part of a bat-banding program, on which some mammals have been taken and saved as specimens, and various ecological and natural history notes have been recorded. These collections are of interest in that they include specimens that represent range extensions and little-known forms. The specimens reported herein are in the collection of the Department of Zoology, University of Arizona, Tucson.

The specimens were taken from the following localities:

1. Cholla Bay, 5 miles northwest of Punta Peñasco, elevation 10 feet. This is an area of shifting sand dunes and is generally characterized by a lack of vegetation. There are scattered creosote bushes, 2 to 3 feet tall, jumping cholla, and teddy-bear cholla. Sparse grass occurs on the higher rocky areas.
2. Thirty-five miles south of Pitiquito, elevation 1500 feet.
3. Puerto Peñasco, elevation 15 feet.
4. Cueva de la Tigre, 14.9 miles by road south-southeast of Carbo, elevation about 1500 feet. This is a volcanic cave in the southeastern face of a low ridge. Vegetation in the area consists of paloverde (three species), mesquite (to 20 feet tall), ocotillo, cholla, prickly poppy (*Argemone*), a *Baileya* composite, organ-pipe cactus, and brittle bush. Numerous visits have been made to this cave to study the bats present. A summary of the dates of these visits will be found in table 1.
5. Near Maytorena, elevation about 150 feet. Maytorena is on the railroad inland from Guaymas. Vegetation consists of jumping cholla, pencil cholla, ocotillo, paloverde, mesquite, acacias, mammillaria (finger cactus, about 6 inches tall), and many weedy fields.

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TABLE 1  
DATES OF VISITS TO, AND ESTIMATES OF BAT POPULATIONS IN, CUEVA DE LA TIGRE,  
14.9 MILES SOUTH-SOUTHEAST OF CARBO, SONORA, MEXICO

	Feb. 17, 1958	Mar. 5, 1960	Apr. 8, 1960	Apr. 11, 1958	Apr. 18, 1959	July 18, 1960	Aug. 7, 1959	Nov. 6, 1959	Nov. 12, 1957	Nov. 30, 1958
<i>Chilonycteris</i>	? <sup>a</sup>	?	?	?	?	?	?	100	?	100
<i>Pteronotus</i>	100	500	300	100	150	?	?	500	x	100
<i>Mormoops</i>	20	20	200	100	100	?	?	?	x	?
<i>Macrotus</i>	100	300	50	200	200	40	?	200	400	200
<i>Choeronycteris</i>	—	1	—	—	—	—	—	—	—	—
<i>Leptonycteris</i>	0	0	200	400	100	30	?	5	?	5
<i>Natalus</i>	100	100	50	0	?	?	?	50	x	?
<i>Myotis velifer</i>	—	1	—	—	—	—	—	—	—	—
<i>Tadarida</i>	2,200	15,000	75,000	200,000	500,000	200,000	2,000,000	10,000	200	15,000

<sup>a</sup> Symbols: ?, probably present; x, present in small numbers; —, probably not present.

6. Bahia San Carlos (San Carlos Bay), elevation about 30 feet. This locality is approximately 14 miles northwest of Guaymas. Narrow mangrove swamps occur sporadically along the shore line. Grasses, mesquites, paloverde and other legumes, organ-pipe cactus, prickly pear, *Washingtonia* palms, and jojoba (*Simmondsia*) are present.

7. North shore of Bocochibampo Bay, elevation about 20 feet. This locality is between Bahia San Carlos and Guaymas. The vegetation consists mainly of grasses, with small areas of ocotillo, organ-pipe cactus, prickly poppy, and mesquite.

8. Isla Blanca. This island in Guaymas Bay is approximately one-quarter mile long and 100 yards wide. It is barren rock, covered by vast quantities of bird guano. Heavy wave erosion has created many crevices and caves along its shore line.

9. A mine tunnel near La Aduana, elevation 1600 feet, 5 miles west of Alamos. Numerous creeks dissect this area, and the vegetation, an Arid Tropical Thornforest, consists of woody plants 15 to 20 feet tall. Morning-glory trees are conspicuous in the area. The mine is a single tunnel that has water standing in almost its entire length. On March 29, 1959, the temperature at the far end of the tunnel was 80° F., and the relative humidity was 100 per cent.

10. Rio Cuchujaqui, elevation 1200 feet, 11.3 miles by road east of Alamos. Cypressess are numerous along this intermittent stream. Most of the vegetation is an Arid Tropical Thornforest; some *Ficus* (wild figs) are present.

We wish to acknowledge the aid of a large number of students who have been on the various trips into Sonora. Among others, we wish to mention Messrs. Roger Carpenter, David Cockrum, Larry Commissaris, Stephen Cross, Alfred Gardner, Patrick Gould, Arthur Harris, Bruce Hayward, Keith Justice, Bill Musgrove, Anthony Ross, and Peter Westcott. Further, we acknowledge the financial aid provided by the National Science Foundation (Grant G-5209, "Biology of the Bats of the Southwest") for this field work.

## ACCOUNTS OF SPECIES

*Notiosorex crawfordi crawfordi* (Coues). Specimens, 35: 1 mile west of Maytorena (from owl pellets).

Bradshaw and Hayward (1960, p. 282) have reported on these specimens taken from owl-pellet material. Snap traps in the same area failed to take this shrew.

*Chilonycteris parnelli mexicana* Miller. Specimens, 30: Cueva de la Tigre, 14.9 miles south-southeast of Carbo, two (one female, April 11, 1958; one male, November 30, 1958); Rio Cuchujaqui, two (one male, one female, March 30, 1959); mine tunnel, La Aduana, 26 (six males, eight females, April 9, 1958; one male, August 6, 1958; three males, four females, November 6, 1959; two males, two females, April 22, 1960).

The specimens from Rio Cuchujaqui were taken in a "mist" net set across a shallow pool in the river bed. In the mine tunnel near La Aduana, several hundred specimens of *Chilonycteris* were present, along with *Leptonycteris*, *Glossophaga*, *Mormoops*, *Pteronotus*, *Natalus*, and *Artibeus*. One of the females taken on April 9, 1958, contained a single embryo that was 6 mm. in crown to rump length.

The northernmost recorded occurrence of this species reported by Hall and Kelson (1959, p. 93) is 15 miles northwest of Guaymas. The specimens from Cueva de la Tigre represent a range extension approximately 150 miles to the northward. *Chilonycteris* apparently is not resident in Cueva de la Tigre throughout the year. As can be seen in table 1, approximately 100 individuals were present on November 30, 1958, and on November 6, 1959. In other months none were observed.

On November 6–7, 1959, five males and two females were banded at Cueva de la Tigre.

*Pteronotus davyi fulvus* (Thomas). Specimens, 43: Cueva de la Tigre, 14.9 miles south-southeast of Carbo, 32 (three males, February 16, 1958; four males, nine females, April 11, 1958; seven males, one female, November 6, 1959; three males, five females, November 30, 1958); mine tunnel at La Aduana, 11 (two males, December 20, 1957; four males, four females, April 9, 1958; one female, March 29, 1959).

No embryos were recorded from any of the females taken.

The northernmost recorded occurrence of this species for the west coast of Mexico reported by Hall and Kelson (1959, p. 94) is Escuinapa, Sinaloa. Constantine (1959, p. 442) has reported the occurrence of *Pteronotus* at Cueva de la Tigre.

Throughout almost all its range *Pteronotus* has been reported to have two color phases—buff and gray. Most of the specimens taken at La Aduana on April 9, 1958, were of the buff phase; at other times both phases were present. The specimens taken from Cueva de la Tigre on April 11, 1958, and on November 30, 1958, were all of the gray phase.

On November 7, 1960, 22 males and nine females of *Pteronotus* were banded at Cueva de la Tigre.

*Mormoops megalophylla megalophylla* (Peters). Specimens, 21 females: Cueva de la Tigre, 14.9 miles south-southeast of Carbo, 19 (one, February 16, 1958; 16, April 11, 1958; two, April 19, 1959); mine tunnel at La Aduana, two (one, November 5, 1956; one, April 9, 1958).

The female taken on April 9, 1958, at La Aduana contained a single embryo that was 8 mm. in crown to rump length. The females taken on April 11, 1958, at Cueva de la Tigre were gravid also, with a single embryo each, the embryos ranging from 11 to 17 mm. in crown to rump length.

*Mormoops* appears to be a permanent resident in Cueva de la Tigre, although the population apparently is smaller during the winter months (see table 1).

*Macrotus californicus* Baird. Specimens, 32: Bahia San Carlos, eight (one female, December 28, 1956; four females, March 27–29, 1959; two males, one female, April 20, 1960); Bocochibampo Bay, one (female, April 21, 1960); 1 mile south-southwest of Maytorena, 500 feet, five (males, November 28, 1958); 14.9 miles south-southeast of Carbo, 18 (one of unknown sex, February 16, 1958; two males, six females, April 11, 1958; nine males, November 30, 1958).

One of the females taken in a mist net at Bahia San Carlos on March 28, 1959, contained a single embryo, 5 mm. from crown to rump. Each of the six females taken near Carbo on April 11, 1958, contained a single embryo, ranging from 11 to 16 mm. from crown to rump.

*Glossophaga soricina leachii* (Gray). Specimens, 28: Mine tunnel at La Aduana, 28 (six males, three females, December 20, 1957; 11 males, three females, April 9, 1958; one male, August 6, 1958; two males, March 29, 1959; one male, one female, April 22, 1960).

One of the females taken on December 20, 1959, was lactating. The testes of the males taken on the same date were enlarged, as were those of the males taken on March 29, 1959.

*Leptonycteris nivalis sanborni* Hoffmeister. Specimens, 16: Cueva de la Tigre, 14.9 miles south-southeast of Carbo, four (three females, April 11, 1958; one male, November 7, 1959); Bahia San Carlos, one (female, March 27, 1959); mine tunnel at La Aduana, 11 (two males, eight females, April 9, 1958; one female, April 22, 1960).

The females taken on April 9, 1958, at La Aduana contained a single embryo each (the one embryo measured was 20 mm. from crown to rump), as did those taken on April 11, 1958, at Cueva de la Tigre (embryos: 23 mm. from crown to rump; 29 mm. from crown to rump; the third was not measured). The female taken in a mist net over a water hole at Bahia San Carlos on March 27, 1959, contained a single embryo, 22 mm. in crown to rump length.

*Leptonycteris* probably is not a year-round resident in Cueva de la Tigre (table 1).

*Sturnira lilium parvidens* Goldman. Rio Cuchujaqui, one male, April 9, 1958.

Until recently, the farthest north on the west coast of Mexico that this species was known was 2 miles north of Ciudad Guzman, Jalisco (de la Torre, 1955, pp. 699, fig. 146C–700). Anderson (1960, p. 7) recorded this species from 1½ miles southwest of Tocuina, 1500 feet, in southwestern Chihuahua.

On the night of April 9, 1958, several bats were observed feeding on wild figs (*Ficus*) growing along the Rio Cuchujaqui. As they were feeding, the bats alighted on the trees. Mist nets set near the trees failed to take any of the bats, but Commissaris succeeded in shooting one adult male. On the night before, April 8, 1958, J. T. Marshall, Jr., captured two *Sturnira*, a male and a female, in a mist net set at Elota, Sinaloa. The female contained a single embryo, 18 mm. in crown to rump length. These specimens also are in the collection at the University of Arizona.

*Artibeus hirsutus* Andersen. Specimens, eight: Rio Cuchujaqui, one (male, March 30, 1959); La Aduana, seven (one male, October 20, 1956; one male, November 5, 1956; two males, December 20, 1957; two males, one female, April 8–9, 1958).

The female taken on April 8, 1958, near La Aduana, contained an embryo, 24 mm. from crown to rump. A male taken at the same time had enlarged testes.

*Natalus stramineus mexicanus* Miller. Specimens, 36: La Aduana, 32 (one male, November 5, 1956; three males, seven females, December 20, 1957; two males, eight females, April 9, 1958; three males, seven females, March 29–30, 1959; one female, April 22, 1960); 14.9 miles south-southeast of Carbo, four (one male, December 20, 1957; one male, February 16, 1958; one of unknown sex, April 11, 1958; one female, November 6, 1959).

The females taken at La Aduana on March 29, 1959, were gravid (one embryo each, 1–5 mm. from crown to rump) as were the females taken at the same place on April 9, 1958 (one embryo each, each embryo, 3 mm. from crown to rump).

Hall and Kelson (1959, p. 153) report specimens of the Mexican funnel-eared bat from 4 miles north of Alamos. Constantine (1959, p. 442) has recorded this species from Cueva de la Tigre, south-southeast of Carbo.

*Myotis californicus californicus* (Audubon and Bachman). Specimens, one: a female taken in a mist net on July 10, 1960, at Bahia Kino.

*Pizonyx vivesi* (Menegaux). Specimens, eight: Isla Blanca, six (sex unknown, December 30, 1956); Isla Alcatraz, Bahia Kino, two (one male, one female, July 9, 1960).

*Pipistrellus hesperus australis* Miller. Specimens, four: Bahia San Carlos, four (two of unknown sex, March 27, 1959; one male, one female, April 20, 1960).

These bats were taken in a mist net over a water hole. The females contained no embryos.

*Dasypterus ega xanthinus* Thomas. Specimens, seven: North shore of

Bocochibampo Bay, three (one male, one female, March 30, 1959; one female, April 21, 1960); Bahia San Carlos, four (one male, April 11, 1958; three females, April 20, 1960).

Although Hall and Kelson (1959, p. 194) indicate on geographic grounds that the southern yellow bat occurs along coastal Sonora, it does not appear to have been recorded from that state. The above specimens were taken in mist nets set over water holes.

*Tadarida brasiliensis mexicana* (Saussure). Specimens, 16: Rio Cuchujaqui, four (three males, one female, April 9–10, 1958); Cueva de la Tigre,

TABLE 2  
ESTIMATES OF POPULATION SIZE OF *Tadarida brasiliensis*  
AND THE NUMBER Banded OR RECOVERED ON VARIOUS  
DATES AT CUEVA DE LA TIGRE

Date	Population Estimates	Banded		Recovered	
		Males	Females	Males	Females
Feb. 17, 1958	2,200	—	—	—	—
Mar. 5, 1960	15,000	5,398	4,550	19	9
Apr. 8, 1960	75,000	1,000	1,000	—	—
Apr. 11, 1958	200,000	10	10	—	—
Apr. 18, 1959	500,000	420	1,297	16	12
July 18, 1960	200,000	94	2,906	0	55
Aug. 7, 1959	2,000,000	500	800	—	—
Nov. 6, 1959	10,000	2,350	1,500	7	2
Nov. 12, 1957	200	—	—	—	—
Nov. 30, 1958	15,000	426	157	1	0

14.9 miles south-southeast of Carbo, 10 (six of unknown sex, February 16, 1958; one male, one female, April 11, 1958; two males, November 30, 1958); 10.4 miles south, 3.4 miles west, of Vigia, two (females, July 9, 1958).

The female taken in a mist net on the Rio Cuchujaqui on April 10, 1958, contained a single embryo, 2 mm. from crown to rump.

Although few specimens of *Tadarida* have been preserved, large numbers have been observed, especially at Cueva de la Tigre. Table 2 summarizes these observations.

*Tadarida molossa* (Pallas). Specimens, one: North shore of Bocochibampo Bay (male, March 30, 1959).

The single male recorded here was taken in a mist net set across a small pool. It appears to be the first record for Sonora.

*Perognathus flavus sonoriensis* Nelson and Goldman. Specimens, two: 3 miles south of Maytorena (March 29, 1959).

This subspecies was previously known only from the type locality (Costa Rica Ranch, lower Rio Sonora, Sonora).

*Perognathus baileyi domensis* Goldman. Specimens, nine: Puerto Libertad, 25 feet, two; Bahia San Carlos, six (four, November 29, 1958; two, April 20, 1960).

*Perognathus penicillatus pricei* J. A. Allen. Specimens, four: North shore of Bocochibampo Bay (four, April 21, 1960).

*Perognathus goldmani* Osgood. Specimens, 13: Rio Cuchujaqui, six (April 9–10, 1958);  $\frac{1}{2}$  mile north of La Aduana, three (April 22, 1960); 6.7 miles north, 17.3 miles east, of Navajoa, four (April 23, 1960).

*Dipodomys merriami merriami* Mearns. Specimens, 22: Desemboque, one (skull only); 35 miles south of Pitiquito, 1500 feet, two; Puerto Libertad, 25 feet, three; Cholla Bay, 5 miles northwest of Punta Peñasco, 13; north shore of Bocochibampo Bay, three.

Specimens from Puerto Libertad and Cholla Bay are much lighter than are specimens from Pitiquito and Bocochibampo Bay. In fact the lighter forms were formerly separated as part of the range of a separate subspecies. Lidicker (1960, p. 168) has shown that populations in this area are best considered as representing a slight clinal trend within the subspecies *D. m. merriami*.

*Dipodomys deserti sonoriensis* Goldman. Specimens, three: Sand dunes, Puerto Libertad, 25 feet, one (December 5, 1953); near Puerto Peñasco, two (November 26, 1955).

*Peromyscus merriami merriami* Mearns. Specimens, two: 28 miles south of Altar, one (skull only, December 1953); Desemboque, one (skull only, December 1953).

These two specimens were secured by Hinton, an anthropology student, on one of his trips to Mexico.

*Peromyscus eremicus anthonyi* (Merriam). Specimens, 33: Rio Cuchujaqui, 14 (two, December 20, 1957; 12, April 10, 1958); Bahia San Carlos, 11 (two, November 28–29, 1957; two, January 2, 1959; seven, March 29, 1959); 6.7 miles north, 17.3 miles east, of Navajoa, two (April 23, 1960);  $\frac{1}{2}$  mile north of La Aduana, five (April 22, 1960); north shore of Bocochibampo Bay, one (April 21, 1960).

*Onychomys torridus perpallidus* Mearns. Specimens, one: Cholla Bay, 5 miles northwest of Punta Peñasco.

*Onychomys torridus yakiensis* Merriam. Specimens, three: Rio Cuchujaqui, one (April 10, 1958); north shore of Bocochibampo Bay, two (April 21, 1960).



*Sigmodon hispidus major* V. Bailey. Specimens, one: 3 miles south of Maytorena (March 29, 1959).

*Neotoma albigula venusta* True. Specimens, 11: Cholla Bay, 5 miles northwest of Punta Peñasco.

*Neotoma albigula melanura* Merriam. Specimens, two: San Carlos Bay, 14 miles northwest of Guaymas (April 20, 1960).

*Tayassu tajacu sonoriensis* (Mearns). Specimens, one: San Carlos Bay, 14 miles northwest of Guaymas, skull only.

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